

## CLAIMS

What is claimed is:

1           1.       An apparatus comprising:  
2           a mask protective device including a transparent portion that is transparent to a  
3       photolithography radiation;  
4           a patterned mask including a pattern defined at least in part by an opaque  
5       portion that is opaque to the particular photolithography radiation;  
6           a wall to connect the mask protective device with the patterned mask, the mask  
7       protective device, the patterned mask, and the wall defining a gas-filled enclosure; and  
8           a vent to add a first gas to the enclosure and to remove a second gas from the  
9       enclosure, the first gas having a substantially different composition than the second  
10      gas.

1           2.       The apparatus of claim 1, wherein the mask protective device is  
2       attached to the patterned mask with an adhesive.

1           3.       The apparatus of claim 1, further comprising a gas source having a  
2       higher concentration of the first gas than the enclosure and a lower concentration of  
3       the second gas than the enclosure and connected with the vent to add the first quantity  
4       of the first gas to the enclosure through the vent.

1           4.       The apparatus of claim 1, wherein the vent includes a first enclosure  
2       opening defined by the wall and a second enclosure opening defined by the wall.

1           5.       The apparatus of claim 4, wherein the wall has a first side and a second  
2       side opposite the first side, and wherein the first enclosure opening is in the first side  
3       and the second enclosure opening is in the second side.

1           6.       The apparatus of claim 1, further comprising a radiation source to  
2       generate radiation with a different wavelength than the photolithography radiation to  
3       transmit radiation through the enclosure to increase the rate of diffusion of the gas in  
4       the enclosure.

1           7.       The apparatus of claim 1, further comprising a rotary vacuum  
2       generator, the rotary vacuum generator including a rotor and a compression chamber  
3       to reduce the total pressure inside the enclosure to below 500 millimeters of mercury.

1           8.       The apparatus of claim 1, wherein the first gas that has a higher  
2       transmissivity for the photolithography radiation than the second gas.

1           9.       The apparatus of claim 1, wherein the vent has a surface area on the  
2       wall that is at least five percent of a total surface area of the wall.

1           10.      The apparatus of claim 1, wherein the vent comprises:  
2               an inlet opening defined by the wall to add a first gas to the enclosure; and  
3               an outlet opening defined by the wall to remove a second gas from the  
4       enclosure.

1           11.      The apparatus of claim 10, further comprising:  
2               a gas source having the first gas at a pressure that is higher than the  
3       pressure of the enclosure and connected with the inlet opening to add the first gas to  
4       the enclosure through the inlet opening; and  
5               a gas destination having a volume at a pressure that is lower than the pressure  
6       of the first gas at the gas source and connected with the outlet opening to remove the  
7       second gas from the enclosure through the outlet opening.

1           12.    The apparatus of claim 10, wherein the wall has a first side and a  
2   second side opposite the first side, and wherein the inlet opening is in the first side of  
3   the wall and the outlet opening is in the second side of the wall.

1           13.    The apparatus of claim 10, wherein the inlet opening includes a  
2   plurality of discrete ports.

1           14.    The apparatus of claim 10, wherein the first gas absorbs less of the  
2   photolithography radiation than the second gas.

1           15.    An apparatus comprising:  
2           a mask protective device including a transparent portion that is transparent to a  
3   particular photolithography radiation;  
4           a patterned mask including a pattern defined at least in part by an opaque  
5   portion that is opaque to the particular photolithography radiation;  
6           a wall to connect the mask protective device with the patterned mask, wherein  
7   the mask protective device, the patterned mask, and the wall define an enclosure; and  
8           a gas filling the enclosure, the gas having a transmissivity of the  
9   photolithography radiation greater than that of the surrounding ambient air.

1           16.    The apparatus of claim 15, wherein the mask protective device is  
2   attached to the patterned mask with an adhesive.

1           17.    The apparatus of claim 15, wherein the gas filling the enclosure  
2   includes less than 10% molecular oxygen by volume.

1           18.    A method comprising:

2 adding a first gas to an enclosure filled with a second gas through a  
3 vent, the first gas having a different composition than the second gas, and the  
4 enclosure being between a mask protective device having a portion that is transparent  
5 to a photolithography radiation, a patterned mask having a portion that is opaque to the  
6 photolithography radiation, and a wall connecting the mask protective device with the  
7 patterned mask; and

8 removing the second gas from the enclosure through the vent.

1 19. The method of claim 18, wherein adding the first gas comprises adding  
2 the first gas through an inlet opening of the vent, and wherein removing the second  
3 gas comprises removing the second gas through an outlet opening of the vent.

1 20. The method of claim 19, wherein adding comprises driving the first gas  
2 into the enclosure through the inlet opening by pressure, and wherein removing  
3 comprises simultaneously driving the second gas from the enclosure through the outlet  
4 opening by pressure.

1 21. The method of claim 18, wherein adding a first gas comprises adding a  
2 molar quantity of gas substantially similar to the molar quantity of the second gas in  
3 the enclosure before adding begins.

1 22. The method of claim 18, wherein adding comprises adding a first gas  
2 that has a higher transmissivity for the photolithography radiation than the second gas.

1 23. The method of claim 18, wherein:  
2 adding the first gas comprises providing a higher concentration of the first gas  
3 on an outside of the enclosure than on an inside of the enclosure proximate the vent  
4 and adding the first gas to the enclosure by diffusion; and

5 removing the second gas comprises providing a lower concentration of the  
6 second gas on an outside of the enclosure than on an inside of the enclosure proximate  
7 the vent and removing the second gas from the enclosure by diffusion.

1 24. The method of claim 23, wherein adding the first gas comprises adding  
2 the first gas through at least two openings of the vent, and wherein removing includes  
3 removing the second quantity of the second gas through the at least two openings.

1 25. The method of claim 18, further comprising transmitting radiation  
2 having a different wavelength than a wavelength of the photolithography radiation  
3 through the enclosure to increase the diffusion coefficient of a molecule in the  
4 enclosure.

1 26. The method of claim 18, further comprising reducing the total pressure  
2 inside the enclosure to below 500 millimeters of mercury.

1 27. The method of claim 18, wherein adding comprises adding a first gas  
2 that has a higher transmissivity for the photolithography radiation than the second gas.

1 28. A method comprising:  
2 attaching a mask protective device having a portion that is transparent  
3 to a photolithography radiation to a wall, the wall being attached to a patterned mask  
4 having a portion that is opaque to the photolithography radiation, the attaching  
5 enclosing a volume of a second gas between the mask protective device and the  
6 patterned mask;  
7 adding the first gas to the enclosed volume of the second gas, the first gas  
8 having a different composition than the second gas; and  
9 removing the second gas from the enclosed volume.

1           29.    The method of claim 28, further comprising transmitting the  
2    photolithography radiation through the mask protective device for a predetermined  
3    period of time.

1           30.    The method of claim 28, wherein attaching comprises attaching with an  
2    adhesive.